IOT PROJECT

SMART MINING HELMET

This report was made to potray the IOT Project made by Group 8 .

ABOUT OUR PROJECT

Smart mining helmets are a recent development in the field of IoT (Internet of Things) that aim to improve safety and efficiency in the mining industry. These helmets are equipped with sensors that can detect a range of environmental factors such as air pressure, temperature, altitude, obstacles, and harmful gases, as well as monitor the wearer's heartbeat. Additionally, the helmets can also track the wearer's GPS coordinates, allowing for better communication and location tracking.

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VISION

Vision of this project is to improve the conditions and Quality of life for miners working in mines in dangerous conditions

MISSION

- To get to know more about IOT
- (To get good marks ^_^)

THE PROBLEMS

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A Brief Description About the Problems

The mining industry is inherently hazardous, and the safety of miners is of utmost importance. Despite the numerous safety measures implemented by mining companies, accidents still occur, leading to injury and even death. One of the major challenges facing mining companies is the inability to monitor and track the safety of miners in real-time. Current monitoring systems are often manual and rely on supervisors to physically check on miners, which can be time-consuming and prone to errors. Additionally, these systems do not provide real-time data on potential hazards such as harmful gases, temperature, and altitude. This lack of real-time monitoring and tracking of miners' safety leaves them vulnerable to potential hazards and compromises their overall safety. Therefore, there is a need for a more advanced and efficient system that can provide real-time monitoring and tracking of miners' safety to improve their overall safety and well-being. The smart mining helmet, equipped with various sensors and communication technologies, provides a potential solution to this problem.

BLOCK DIAGRAM

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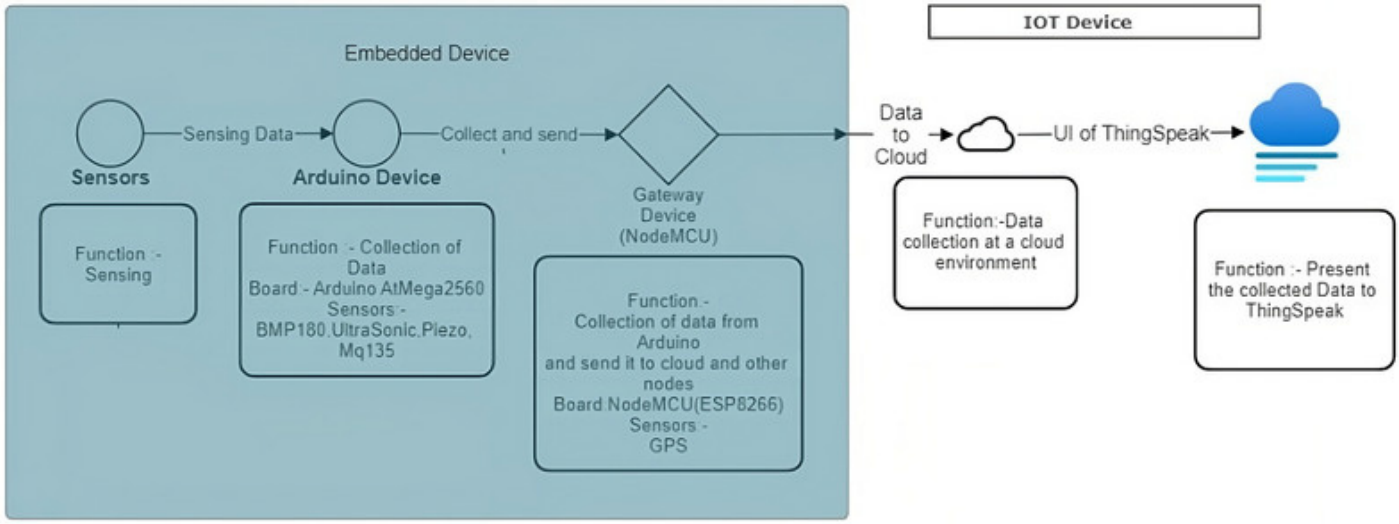

DATA FLOW DIAGRAM

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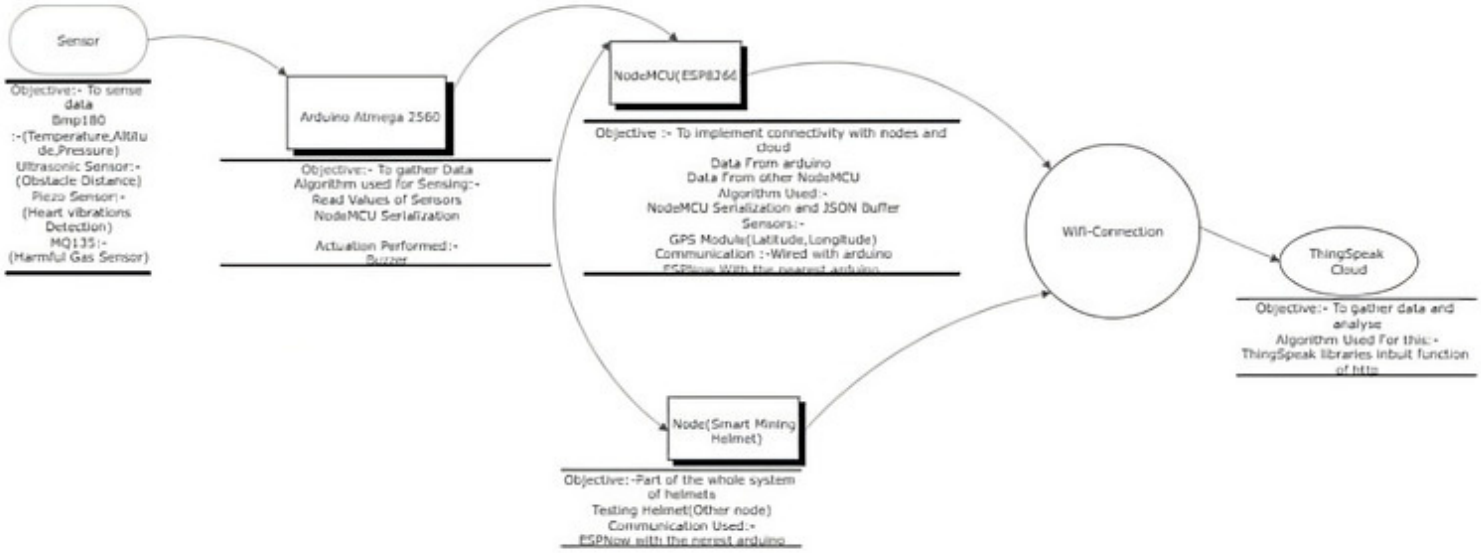

SENSORS

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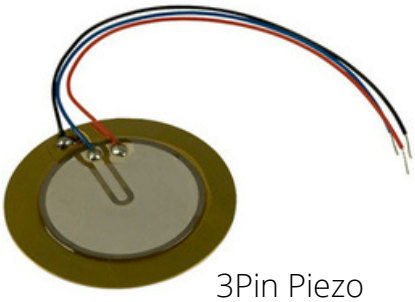
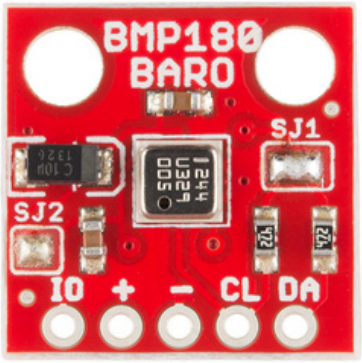


3Pin Piezo

MQ135



BMP180

UltraSonic Sensor

GPS Module

IMPLEMENTATION AND RESULTS

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For a successful implementation of the smart mining helmet, the following steps are typically followed:

1. Sensor Integration: The first step is to integrate the various sensors into the helmet. These sensors include those for detecting air pressure, temperature, altitude, obstacles, heartbeat, and harmful gases. The sensors are carefully selected to ensure that they can withstand the harsh conditions of the mining environment.
2. Node-to-Node Connectivity: The next step is to establish node-to-node connectivity between the helmets and other devices, such as supervisors' tablets or laptops. This is achieved by using wireless communication protocols such as ESPNow
3. Algorithm Development: Once the sensors are integrated and the connectivity is established, algorithms are developed to process the sensor data. These algorithms are designed to detect potential hazards and alert miners or supervisors accordingly.
4. GPS Integration: GPS is integrated into the helmet to enable real-time tracking of the wearer's location. This allows supervisors to locate miners in case of emergencies and to monitor their movements to ensure their safety.
5. Cloud-Based Data Management: The sensor data and GPS coordinates are sent to a cloud-based platform such as Thingspeak, where they are stored and analyzed. This allows for a more comprehensive understanding of mining conditions and worker safety.
6. Testing and Deployment: Once the helmets are fully integrated and the algorithms are tested, they are deployed in the field for real-world testing. The data collected is analyzed to identify any issues and to optimize the system for improved performance.

Overall, the implementation process for the smart mining helmet is a complex one that requires careful planning and execution. However, the benefits of improved worker safety and optimized mining operations make it a worthwhile investment for mining companies.

Algorithm:-

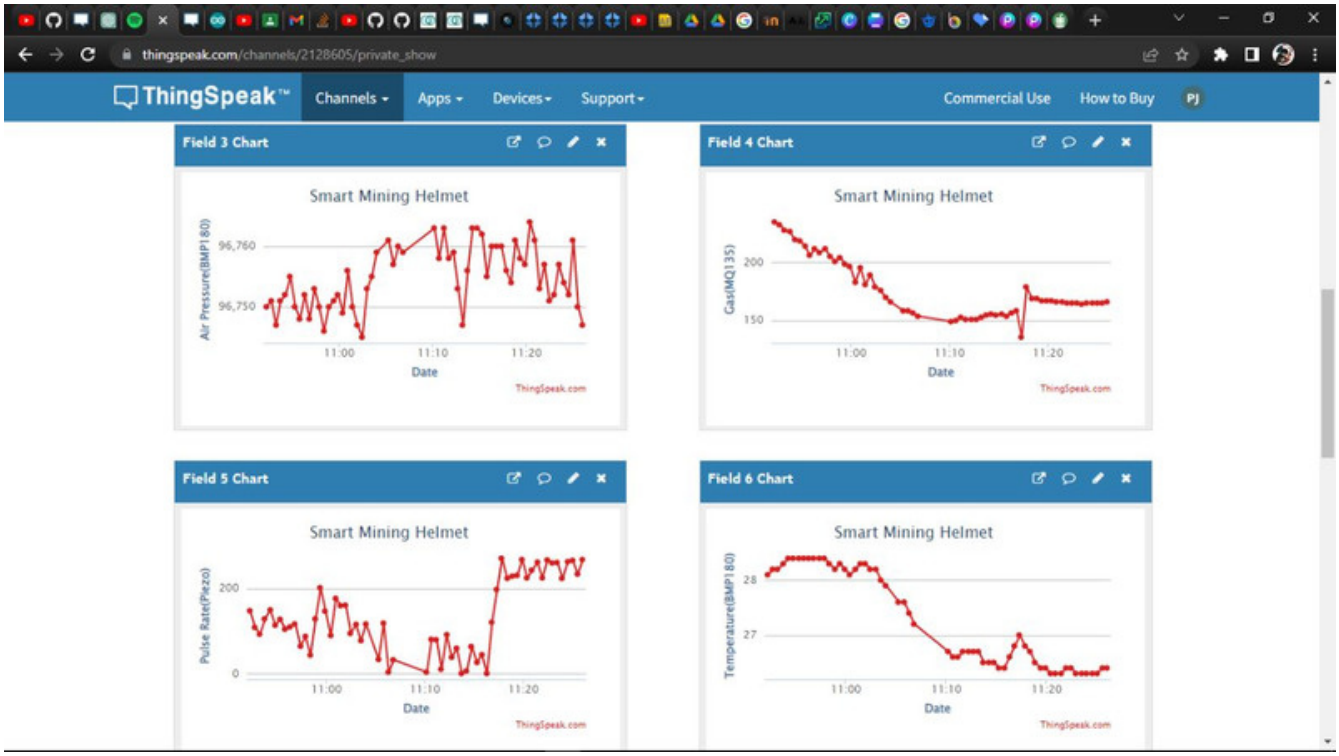
- ESPNow:-

ESP-NOW is a wireless communication protocol developed by Espressif Systems that enables low-power devices to communicate with each other without the need for a Wi-Fi network or internet connection. It operates on the 2.4 GHz band and uses a proprietary protocol to achieve high-speed, low-latency communication.
The protocol is particularly useful for IoT devices that require real-time, low-power communication, such as smart mining helmets. With ESP-NOW, the helmets can communicate with each other and with supervisors' devices in a node-to-node network, enabling real-time monitoring and alerting of potential hazards.

- ThingSpeak connect:-

ThingSpeak is its compatibility with MATLAB, a popular programming language used for data analysis and visualization. This allows users to integrate custom algorithms and models into the platform to further analyze the data.
Overall, ThingSpeak is a powerful cloud-based platform that provides an easy and efficient way to manage and analyze data from IoT devices. Its compatibility with various IoT devices and its wide range of data visualization and analysis tools make it an attractive option for smart mining helmets and other IoT applications.

Results:-



Here are some of the few screenshots of the results we got on the ThingSpeak cloud

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Conclusion

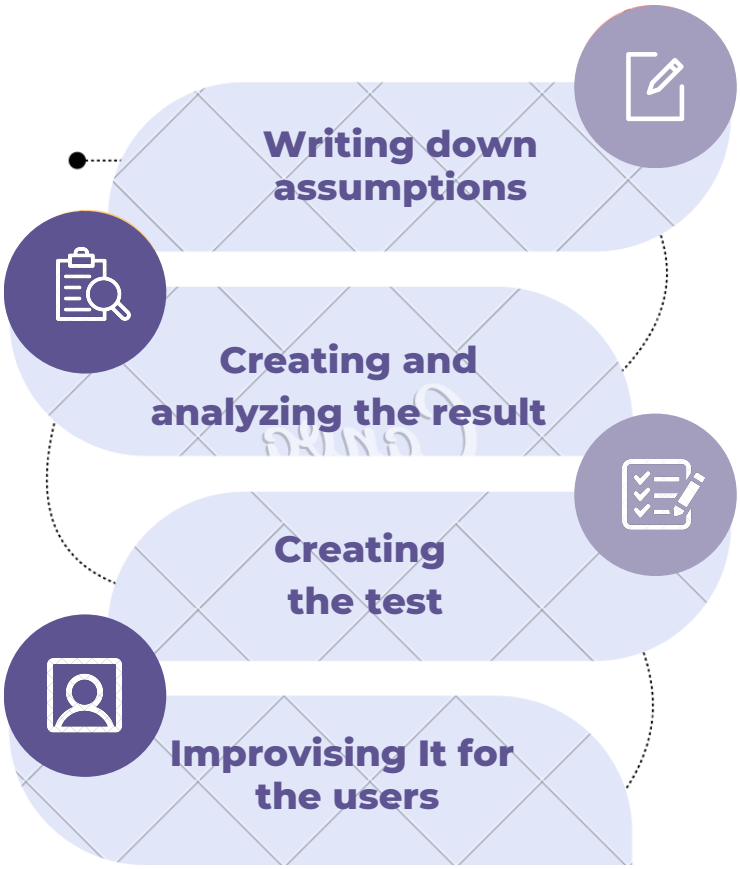
In conclusion, the smart mining project discussed in this chat represents a major breakthrough in the mining industry. By utilizing IoT technologies, such as sensors, node-to-node connections, and cloud-based platforms, smart mining helmets have the ability to provide real-time monitoring and data analysis of various environmental and physiological factors that affect worker safety.

The helmets' advanced algorithms enable the detection of potential hazards, such as harmful gases and obstacles, allowing miners to take appropriate action to prevent accidents. Additionally, the helmets' GPS tracking capabilities provide an added layer of safety by enabling supervisors to track the location of their workers in real-time.

The integration of Thingspeak into the project allows for the storage and analysis of data, providing valuable insights into the working conditions of miners. These insights can be used to optimize mining operations and improve safety standards.

Overall, the smart mining project is a prime example of the potential benefits of IoT technologies in enhancing workplace safety and productivity. With further advancements in these technologies, we can expect to see continued improvements in mining operations and worker safety.

Our Approach



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BiblioGraphy

The refrences we used for our project are:-

- ChatGPT
- StackOverflow
- Arduino.org
- randomtutorials.com
- Github
- Help from other teams

OUR SUPER TEAM

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The project development project has been going on for a few eeks, yet we still need to evaluate it every day to make sure that it performs its best. For future requests, we can make this more sturdy with more refined edge cases, and more optimum using machine learning algorithm , and we can also use video referencing and image processing to make it more advances

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https://thingspeak.com/channels/2128605/private_show